

WHAT IS CLAIMED IS:

1. A monolithic transmission line capacitor comprising:
  - a body composed of a first dielectric material;
  - at least two multilayer capacitors disposed within 5 said body, each multilayer capacitor characterized by a respective capacitor height;
  - wherein said at least two multilayer capacitors are positioned substantially parallel to one another thereby providing a substantially constant spacing distance between 10 said at least two multilayer capacitors;
  - wherein each of said at least two multilayer capacitors is composed of a plurality of electrodes interleaved among a plurality of insulating substrates;
  - wherein said insulating substrates are composed of a 15 second dielectric material;
  - wherein each of said at least two multilayer capacitors further comprises first and second terminations respectively connected to selected of said plurality of electrodes thereby providing a capacitor-signal-path 20 through each respective multilayer capacitor; and
  - wherein each said capacitor height, said spacing distance and said first dielectric material are selected to yield a predetermined capacitor-signal-path to capacitor-signal-path impedance for the monolithic transmission line 25 capacitor.
2. A monolithic transmission line capacitor as in claim 1, wherein said capacitor-signal-path to capacitor-signal-path impedance substantially equals the line-to-line impedance between two signal paths external to said

5 transmission line capacitor and respectively connected to said first terminations of said at least two multilayer capacitors.

3. A monolithic transmission line capacitor as in claim 1, wherein said capacitor-signal-path to capacitor-signal-path impedance is about 100 ohms.

4. A monolithic transmission line capacitor as in claim 1, wherein said at least two multilayer capacitors have substantially the same height, substantially the same length and substantially the same width.

5. A monolithic transmission line capacitor as in claim 1, wherein at least one capacitor attribute from the group of attributes consisting of (1) multilayer capacitor length, (2) multilayer capacitor height, (3) multilayer capacitor width, (4) number of electrodes comprising said plurality of electrodes and (5) type of said second dielectric material, is selected to yield a predetermined capacitance value for each of said adjacent multilayer capacitors while substantially maintaining said 10 predetermined capacitor-signal-path to capacitor-signal-path impedance.

6. A monolithic transmission line capacitor as in claim 1, wherein selected of said first and second dielectric materials are composed of a material selected from the group consisting of NPO (COG), a low-K X7R, a 5 high-K X7R, Z5U and Y5V.

7. A monolithic transmission line capacitor as in claim 1, wherein said first dielectric material has a dielectric constant of greater than about 50.
8. A monolithic transmission line capacitor as in claim 1, wherein said first dielectric material is composed of a high-K dielectric material and said second dielectric material is composed of a low-K dielectric material.
9. A monolithic transmission line capacitor as in claim 1, wherein said first dielectric material and said second dielectric material are composed of a low-K dielectric material.
10. A monolithic transmission line capacitor as in claim 1, wherein said second dielectric material has a dielectric constant of less than about 20.
11. A monolithic transmission line capacitor as in claim 1, wherein said second dielectric material is a co-fired ceramic material.
12. A monolithic transmission line capacitor as in claim 1, wherein said first dielectric material and said second dielectric material are composed of the same material.
13. A monolithic transmission line capacitor, comprising:
  - a body composed of a first dielectric material;

at least two multilayer capacitors disposed within  
5 said body, each said multilayer capacitor being  
characterized by a multilayer capacitor height;

wherein said at least two multilayer capacitors are  
positioned substantially parallel to one another thereby  
providing a substantially constant spacing distance between  
10 said at least two multilayer capacitors;

wherein each of said at least two multilayer  
capacitors is composed of a plurality of electrodes  
interleaved among a plurality of insulating substrates;

wherein said body comprises a channel formed within  
15 said spacing distance, said channel being characterized by  
a channel width and filled with a second dielectric  
material;

wherein each of said at least two multilayer  
capacitors further comprises first and second terminations  
20 respectively connected to selected of said plurality of  
electrodes thereby providing a capacitor-signal-path  
through each respective multilayer capacitor; and

wherein selected of said multilayer capacitor height,  
said channel width, said first dielectric material and said  
25 second dielectric material are selected to yield a  
predetermined capacitor-signal-path to capacitor-signal-  
path impedance for said monolithic transmission line  
capacitor.

14. A monolithic transmission line capacitor as in  
claim 13, wherein said capacitor-signal-path to capacitor-  
signal-path impedance substantially equals the line-to-line  
impedance for two external transmission lines connected to  
5 respective terminations of said at least two multilayer  
capacitors.

15. A monolithic transmission line capacitor as in claim 13, wherein said second dielectric material is air.

16. A monolithic transmission line capacitor as in claim 13, wherein said channel width is substantially equal to the width of said spacing distance.

17. A monolithic transmission line capacitor as in claim 13, wherein said first dielectric material has a dielectric constant of greater than about 50.

18. A monolithic transmission line capacitor as in claim 13, wherein said second dielectric material is one of glass material and epoxy material.

19. A monolithic transmission line capacitor as in claim 13, wherein said plurality of insulating substrates are composed of a third dielectric material.

20. A monolithic transmission line capacitor as in claim 19, wherein said at least two multilayer capacitors have substantially the same height, substantially the same length and substantially the same width.

21. A monolithic transmission line capacitor as in claim 20, wherein at least one capacitor attribute from the group of attributes consisting of (1) said height, (2) said length, (3) said width, (4) number of said plurality of electrodes and (5) type of said third dielectric material, is selected to yield a predetermined capacitance value for

each of said multilayer capacitors while maintaining said capacitor-signal-path to capacitor-signal-path impedance.

22. A monolithic transmission line capacitor as in claim 19, wherein selected of said first dielectric material and third dielectric material is composed of a material selected from the group consisting of NPO (COG), a  
5 low-K X7R, a high-K X7R, Z5U and Y5V.

23. A monolithic transmission line capacitor as in claim 19, wherein said second dielectric material has a dielectric constant of less than about 20.

24. A monolithic transmission line capacitor, comprising:

at least two adjacent multilayer capacitors wherein each multilayer capacitor is disposed within a body, each  
5 said body being composed of a first dielectric material, wherein each said body is separated from an adjacent body by a spacing layer composed of a second dielectric material;

wherein each of said multilayer capacitors is composed  
10 of a plurality of electrodes interleaved among a plurality of insulating substrates;

wherein each of said multilayer capacitors further comprise first and second terminations respectively connected to selected of said plurality of electrodes  
15 thereby providing a capacitor-signal-path through each respective multilayer capacitor;

wherein the width of said spacing layer is substantially equal to the distance between two external

signal paths connected to respective of said first  
20 terminations of said adjacent multilayer capacitors; and  
wherein selected of multilayer capacitor height, the  
type of said first dielectric material and the type of said  
second dielectric material is selected to yield a  
predetermined capacitor-signal-path to capacitor-signal-  
25 path impedance for said adjacent multilayer capacitors.

25. A monolithic transmission line capacitor as in  
claim 24, wherein said capacitor-signal-path to capacitor-  
signal-path impedance substantially equals the line-to-line  
impedance for said external signal paths.

26. A monolithic transmission line capacitor as in  
claim 24, wherein said capacitor-signal-path to capacitor-  
signal-path impedance is about 100 ohms.

27. A monolithic transmission line capacitor as in  
claim 24, wherein said first dielectric material is  
composed of a high-K dielectric material and said second  
dielectric material is composed of a low-K dielectric  
5 material.

28. A monolithic transmission line capacitor as in  
claim 24, wherein said second dielectric material has a  
dielectric constant in the range from about 5.0 to about  
10.0.

29. A monolithic transmission line capacitor as in  
claim 24, wherein said second dielectric material is a co-  
fired ceramic material.

30. A monolithic transmission line capacitor as in claim 24, wherein said plurality of insulating substrates is composed of a third dielectric material.

31. A monolithic transmission line capacitor as in claim 30, wherein selected of said first dielectric material, said second dielectric material and said third dielectric material is composed of a material selected from 5 the group consisting of NPO (COG), a low-K X7R, a high-K X7R, Z5U and Y5V.

32. A monolithic transmission line capacitor as in claim 24, wherein said first dielectric material has a 10 dielectric constant at least about 50 and wherein said second dielectric material has a dielectric constant of less than about 20.